

Waste Minimisation Notes

Earth Works was a project of KESAB, funded by the
SA Waste Management Committee in 2001.

Contents:

[About Earth Works](#)

[Introduction](#)

[Waste Disposal Practices](#)

[Problems of Waste and Its Disposal](#)

[Sustainable Waste Management](#)

[Roles and Responsibilities in Waste Management](#)

[The Waste Hierarchy](#)

[Getting Practical with the 3 Rs](#)

[References](#)

About Earth Works

The Earth Works: Living with Less Waste is an interactive, education program that puts people in touch with waste minimisation, recycling and composting techniques designed to help us save our environment. The program aims to establish collaborative action within local communities to improve the quality of the environment. Its focus on reducing waste from source through disposal gives it the potential to effect significant waste minimisation across the state.

Acknowledgements

The Earth Works: Living with Less Waste program is based on a program of the same name developed by the NSW EPA. In South Australia, KESAB and Recycle 2000 initially redeveloped the program; in this edition, KESAB and the S.A. Waste Management Committee have worked in partnership on this project. KESAB is also grateful for the feedback provided by the cities of Campbelltown and Tea Tree Gully, Solo Resource Recovery and Entertaining Environmental Education.

The Editor would especially like to thank Adrian Cerchez, Joh Jensen, Tom Coote, Justin Lang, Dick Olesinski, John Phillips, Daniel Popping and Peter Schulz for their valuable assistance in redeveloping Earth Works, and to Amanda Gulliver and Jo Hendrikx for developing the school's component. I am also indebted to John Denlay and Peter Rutherford who developed the program originally in New South Wales and have maintained a keen interest in the program's development in South Australia.

Claire Butler

2001 KESAB Waste Education Coordinator

INTRODUCTION

What is Waste?

When asked what waste is, most people would respond with words like 'useless or worthless material', or 'stuff to be thrown away'. This implies that the materials we cram into our garbage bins each week, and fill our tips with, are useless. This is not true: many of these materials are not useless—they are just carelessly discarded.

We throw waste 'away'—but where is 'away'? Few of us would choose to live next to a garbage dump, so why should we expect that another community would want to take our garbage?

Question: When does something become waste?

Answer: Most people think that once something is thrown into the garbage bin it becomes waste! But is this always the case? Materials are waste when we have no more use for them; many things we put in the bin may still have a use. An item really becomes waste when we decide that it should be. This decision can be made by manufacturers when they manufacture a product that is difficult to recycle or to reuse (for example, single-use packaging is designed to be garbage). The decision can also be made by each of us when we choose a throw-away product or toss something in the bin. Waste is something we *do*, either consciously or not, as individuals and as a society. This implies a need to re-think our definition of waste and our use of materials.

If we are to solve the waste crisis, we need to examine the act of wasting more closely than the waste itself. It is our actions, individually and collectively, that must change.

A good place to start looking for answers to our waste problem is to look at nature. Humans are the only species that produces 'waste'. All other species use only what they need, and their by-products then become a resource to be used by other organisms.

In sharp contrast, humans have polluted land, air and water to an extent that our health, the health of other life-forms, and the health of the entire planet is at risk.

We have created waste by:

- over-using or misusing resources in our production processes
- using more than we really need in our daily lives
- mixing materials together, making them just about impossible to use again.

Not only do we create a huge amount of waste—some of it is toxic. Cleaning out a typical kitchen sink cupboard or garage workshop can produce quite a nasty cocktail of chemicals that some people deliberately or innocently pour down the drain or toss in the bin.

As the US chemistry professor and waste activist, Paul Connett, notes in his video *As if the Future Mattered*, we have mixed the smelly with the unsmelly, the toxic with the non-toxic and the useful with the useless—so it is no surprise that our waste is smelly, toxic and useless.

Attitudes to Waste

Our attitudes to waste are evident in the language we use to describe it. Waste is given such names as refuse, garbage, and trash, each conveying images of filth and uselessness.

It is worth considering the following questions:

What is your attitude to waste? Are you deeply concerned about garbage, or is it someone else's problem—maybe the government's? What are your neighbours' attitudes? What about your friends, family and workmates?

There are probably as many different attitudes to waste as there are people. As Earth Workers, you have an important opportunity to influence the attitude of the people you come in contact with.

Confrontation with people who couldn't care less about waste is unlikely to be effective. It may make them even more reluctant to change. A more effective approach is probably to use their existing attitudes as a starting point for exploring new and empowering alternative ways of looking at the problems of waste.

So the huge pile of garbage may be the visible sign of our waste crisis, but our attitudes to waste, as individuals and as a society, are the starting point for our solutions. The waste minimisation notes here will give you plenty of information about the problems of waste and the many solutions that are available. It may surprise you to find your own attitudes to waste changing as you read these pages.

TODAY'S WASTE ISSUES

Too Much Waste—and Nowhere for It to Go

Throughout history, humans have discarded things for which they had no further use. Nomadic peoples left waste behind; in towns, many simply threw waste into the streets. As settlements and populations grew, the quantities of waste burgeoned.

The second half of this century has seen technological developments raise living standards for a portion of the world's population. With this has come a massive increase in the amounts of waste being generated. During this same period we have witnessed an era of consumerism, an era in which durability has been replaced by the convenience of 'throw-away'. Alvin Toffler, in his book *Future Shock* (1970), refers to this change as 'the economics of permanence [being] replaced by the economics of transience'. Victor Lebow, a marketing consultant in the 1950s, wrote a plea in the *New York Journal of Retailing* for 'forced consumption'. He said:

Our enormously productive economy...demands that we make consumption a way of life, that we convert the buying and use of goods into rituals, that we seek our spiritual satisfaction in consumption...We need things consumed, burnt up, worn out, replaced and discarded at an ever-growing rate (in Seymour & Girardet 1989, p.77).

One salient result of our changing patterns of consumption has been a massive increase in the amount of waste that needs disposal.

After the phenomenal growth of waste levels throughout the 1970s and 1980s, many areas of Australia began to face a shortage of disposal capacity. By 1989, existing landfills in Australia had on average only about 12 years worth of space left. Some city areas have even less.

Proposals to site new disposal facilities meet with strong community opposition. Communities are concerned about the environmental impacts of both landfills and the transportation of huge quantities of waste.

The Kinds of Waste We Throw Out

Australians generate a large amount of waste. We are among the most wasteful people on a per capita basis: we are twice as wasteful as Western Europeans.

Waste data show that since 1990 Australians have been throwing away about 10 million tonnes of solid domestic, commercial and industrial waste each year.

Household Waste

Domestic waste includes household garbage that is:

- collected regularly by councils, and/or
- transported and disposed of privately by households, and/or
- collected in periodic council clean ups.

This type of waste alone amounts to 350 kilograms per person per year—almost half of the total amount of solid waste produced each year. Much of it is recyclable.

Commercial & Industrial Waste

Commercial and industrial sources of waste include offices, factories, shops and hospitals. This sector contributes 35–40% of the total solid waste, or about 370 kilograms per person per year. A large proportion of the commercial and industrial waste is made up of packaging. About two-thirds of it is recyclable, yet only 14% is recycled.

Compostion of the total waste stream

Aluminium cans	0.1%
PVC	0.3%
PET	0.4%
Other St	0.5%
Polypropylene	0.6%
HDPE	1.1%
Liquidpaperboard	1.1%
Steel cans	2.0%
Other Plastic	3.3%
Glass	5.6%
Old Newsprint	9.2%
Paper and cardboard	10.8%
Other	11.1 %
Food	23.5%
Garden	24.0%

Source: Metropolitan Waste Analysis 1996, Recycle 2000

Organic Waste

Green waste includes such things as grass clippings, leaves, tree prunings, wood packaging, wood off-cuts, food processing wastes, fruit and vegetable scraps.

According to Recycle 2000's statistics, green waste comprises around 50% of the total waste in SA. About 33% of commercial and industrial waste is organic (garden, food, timber / wood) Source: Blueprint for Integrated Resource Recovery.

Construction & Demolition Waste

The building construction and demolition industry accounts for about 20% of all solid waste. This waste consists mainly of concrete, timber, metals and other building materials. If each of us were deemed to be responsible for his/her share, building and demolition wastes would amount to 180 kilograms per person per year.

As tipping space becomes shorter in supply, the construction industry is attempting to reduce waste through the reuse and recycling of most of this material.

The Toxicity of Waste

While less than 1% of solid waste consists of toxic substances, their potency makes them a problem. Some products contain toxic substances such as mercury, lead and cadmium; these products include car and other batteries. (The lead in car batteries is readily recyclable.) Paints, solvents and used lubricating oils also contain toxic materials; these should be disposed of at the EPA Depot at Dry Creek or another facility capable of handling these materials).

WASTE DISPOSAL PRACTICES

Council Collection of Household Waste

Most household waste is collected by local councils at the kerbside. The waste is collected once a week by compactor trucks that can pack up to 10 tonnes of waste. *Case Study: Marion Council*

Landfills

Waste is no longer simply dumped into open holes in the ground called tips. Instead, landfills are carefully planned and managed. At any one time, only a small 'face' of the landfill is being worked. As waste is dumped, landfill compactors pack the waste down. After each day's operation, this compacted waste is covered with earth to stop it from blowing around and to prevent pest infestation.

Once it has been packed in the landfill, the waste slowly begins to react. Organic wastes begin to break down anaerobically (without air). This process produces 'landfill gas' (which is mostly methane) and organic acids. Rain and the liquids in the waste itself mix with other substances as they percolate through the waste to produce what is called leachate.

When a landfill is full, it is capped with soil and contoured to minimise the seepage of water into the waste below. The area is usually regenerated by the planting of grasses and native trees and made into a recreation area.

Case Study: Solo Waste

Case Study: Fresh Kills, USA

Fresh Kills is the name of the world's most famous garbage dump. It consists of 68 million cubic metres of garbage—not much smaller than Uluru—and covers 1,215 hectares. It is located on New York's Hudson River. First used in 1948, it takes half of the city's waste—100,000 tonnes a week. It has the dubious status of being the largest human-made structure on the earth, and is even visible from space.

Incinerators

While most waste in Australia is landfilled, in many parts of the world and in some areas of Australia, solid waste is incinerated. The ash residue is taken to landfill for disposal. Many of the incinerators overseas are used to generate power or steam for district heating.

In Australia, disposal by incineration has been practised to a limited extent in recent years.

Non-domestic Waste Disposal

Councils generally provide waste collection services for households only. Businesses and industry must arrange for contractors to collect their waste. Some councils compete with the private sector for this business. Private waste collectors charge their clients according to the amount of waste collected. The *Waste Management and Minimisation Act 1995* identifies the concept that councils, through their Waste Boards (where appropriate), are responsible for waste disposal in the domestic sector.

PROBLEMS OF WASTE AND ITS DISPOSAL

Although we have come a long way in South Australia from the rotting, open tips of the 1960s, waste disposal is still a problem. The various disposal methods available today have their own problems.

Problems of Waste

Throwing resources away

The resources present in the waste are lost when waste is buried. In many cases these resources are used for only a short time before being thrown away.

The production of raw materials is often associated with significant environmental impacts. To produce 1 tonne of aluminium, for instance, over 5 tonnes of bauxite ore must be mined.

Using raw materials in production can often generate more pollution than the recycling process does. Recycling paper, for example, uses only 10% of the water and half of the energy required for making paper from raw materials, and produces less than a quarter of the pollution.

Energy use is an important issue today, particularly as most of the energy produced in Australia comes from burning fossil fuels, which contributes to our greenhouse gas problem.

Re-using and recycling often save considerable energy in production. For example, simply washing and re-using glass bottles consumes only one fifth of the energy used for making new bottles from raw materials.

Throwing Money Away

Management and operation of landfills, including the daily covering, landfill gas collection, leachate control and site rehabilitation, involve significant costs. Operating transfer stations and transporting waste also make disposal an expensive process. These costs are likely to rise in the future if disposal facilities are located further from urban areas, or if incineration becomes the main method of waste disposal.

We all pay for waste disposal. In total, it costs Australians about \$1 billion a year to collect and dispose of all waste. Furthermore, we all pay our share again for disposing of commercial and industrial waste through higher prices for goods and services.

Litter

The sight of a marine animal choking on a plastic bag clearly highlights the problems that litter creates. Broken glass, plastics and bits of metal on our streets, parks and waterways are real hazards to people and animals.

And then there's the cost of cleaning up this mess!

Graphic examples of the impact of litter

Problems of Waste Disposal

There are now strict regulations in place in South Australia to protect the environment from landfill discharges and emissions. Decisions about the siting and operation of landfills are governed by legislation which requires careful consideration of potential environmental and social impacts before projects are allowed to proceed.

Landfill Gas

This gas is typically made up of 60% methane and 40% carbon dioxide and other trace gases. Methane is a flammable gas which has caused fires in the past. Piping is installed throughout landfills in ways that depend on the quality and type of waste accepted. In some cases, the gas is used as an energy source for generating electricity.

Some of the trace gases released at landfills, including hydrogen sulfide and sulfur trioxide, are hazardous.

Leachate

Liquids that have percolated through the landfill form another liquid known as leachate. When this is mixed with organic acids (produced by the anaerobic rotting of kitchen waste) and other hazardous substances present in the waste, it can become extremely toxic. Leachate can also contain high levels of nutrients and organic matter which, if they reach waterways, can result in increased algal growth and weed infestation.

In modern landfill strategies, stormwater diversion, leachate collection and landfill lining are used to prevent the contamination of groundwater, surface water and streams.

When a landfill is full the site must be restored. Contouring and tree planting help to control stormwater and prevent erosion. But the problems surrounding landfills do not continue for only weeks or years—landfills can be a problem for generations. Landfill gas and leachate may continue to be processed for at least 20–30 years after the landfill has been closed. The entombed garbage takes a long time to break down. A disposable nappy may take up to 500 years to break down! Archaeologists have dug up old landfills in the USA and found 20-year-old corn cobs still intact, and newspapers of the same age, still readable.

SUSTAINABLE WASTE MANAGEMENT

Ecologically Sustainable Development

The problems of waste production and disposal are just some of the myriad environmental problems facing us on this planet.

Ecologically Sustainable Development (ESD) is an important concept that has emerged in the last two decades; it provides guidelines on how to address our many environmental problems.

The World Commission on Environment and Development, in its Brundtland Report (1987), defines ESD as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

This definition highlights two important points:

- The finite nature of our planet. We are using many resources at rates that are unsustainable. We are polluting the land, air and water with quantities and qualities of materials that the environment cannot tolerate.
- Attention must be given to the way in which the world's needs are satisfied. Two-fifths of the world's population (about two billion people) live in poverty. The 26% of the world's population that constitutes the affluent nations controls 80% of the world's resources. An average Australian consumes 17 times more than an average African, and thus has 17 times the impact on the environment (Brundtland Report).

If we are already straining the planet's resources and natural waste disposal systems, and if inequity in the use and distribution of resources is so pronounced, then a sustainable future demands that developed nations such as Australia cut back on resource use and waste production.

Sustainable Management of Waste

At the broadest philosophical level there is widespread concern that we are turning our precious natural resources into rubbish at an unacceptable rate. More than ever before, our society recognises that the trees, sand, water and energy used to produce the products we consume are finite natural resources. Society also recognises that land is a scarce and valuable resource that it is less and less prepared to hand over for waste disposal facilities. The disposal of biodegradable wastes in landfills can have environmental impacts, some of which may be difficult or expensive to control. These concerns translate into a new view of waste as a potential resource that sees avoidance, reuse and recycling as first order considerations, and disposal a last resort (see the diagram overleaf).

Metropolitan Adelaide currently disposes of 950,000 tonnes of waste each year—a substantial improvement on the 1.3 million tonnes we were producing in 1990. But waste generation is increasing and is soon likely to outstrip the reprocessing activities of the community.

Householders in South Australia currently recover 15% of our domestic waste through recycling—this ranks us among the world's best recyclers. But the pressure is on to do more. After initial gains between 1990 and 1995 in reducing the amount of waste generated. There is now a fresh spurt of growth in the amount of waste being generated. Per capita waste generation grew to 0.91 tonnes in 1994. It is likely that this increase will soon overtake the reprocessing activities of the community, and that there will be an increase in waste going to landfill.

Our state's commitment to recycling has enabled us to make valuable progress towards our target of a 50% reduction in the waste going to landfill by 2000, but there is potential for us to make greater strides towards this target by reducing other waste types. Getting rid of the barriers that hinder the reprocessing and reuse of these materials is a key objective of Local and State Government's work over the coming years.

Integrated Waste Strategy for Metropolitan Adelaide 1996 – 2015

The Integrated Waste Strategy for Metropolitan Adelaide 1996 – 2015 is was developed to guide decision making and policy initiatives for all forms of waste. It provides for continuing review in response to changing waste management practices in South Australia, interstate and overseas, a growing community awareness of environmental social and resource management issues, and a changing waste stream over the last decade.

A prime driving force for the EPA SA is the set of principles contained in the Objects of the Environment Protection Act of 1993, which promote Ecologically Sustainable Development, (ESD) allowing:

people and communities to provide for their economic, social and physical wellbeing and for their health and safety;

all reasonable and practical measures to be taken to protect, restore and enhance the quality of the environment;

where practical, elimination of harm to the environment;

prevention, reduction, minimisation.

In addition to ESD, the Objects also embrace the following underlying principals, as laid out internationally in Agenda 21 and nationally in the Inter-Governmental Agreement on the Environment:

precautionary principle

inter-generational equity

conservation of biological diversity;

improved valuation, pricing and incentive mechanism, embodying “polluter pays” and “user pays” principles and costing using life-cycle analysis.

High standards of waste management may be achieved at a relatively low cost when combined with waste minimisation and resource recovery activities. However, a key element must be improved planning of future waste management facility sites, addressing the needs, both of the facilities and of the host communities.

from the Executive summary to the Integrated Waste Strategy for Metropolitan Adelaide 1996 – 2015.

ROLES AND RESPONSIBILITIES IN WASTE MANAGEMENT

All sectors of our society—government, industry, community groups and individuals—have important roles to play in reducing waste. The roles outlined below were current in mid-1996 but may change over time.

Federal & State Government

National Waste Minimisation Strategy

The Commonwealth Government's Environment Protection Agency (EPA) released a National Waste Minimisation and Recycling Strategy in mid-1992. In consultation with industry and state governments it set the following key targets:

a national target of a 50% reduction of waste going to landfill, by 2000

targets for recycling of various materials as part of a National Kerbside Recycling Strategy

targets for the reduction in the amount of packaging requiring disposal.

National Kerbside Recycling Strategy!

Commonwealth and state governments have negotiated the following recycling targets with industry:

Plastic containers	25% collected and recycled by 1995
Glass	45% collected and recycled by 1995
Aluminium cans	65% collected and recycled by 1995
Steel cans	25% collected and recycled by 1996 (40% by 2000)
Milk/juice cartons	20% collected and recycled by 1995
Newsprint	40% collected and recycled by 1995
Paper packaging	to be made of 71% recycled fibre by 1995.

Recycling Programs

All Adelaide Metropolitan Councils provide some form of kerbside recycling program. Many are planning to improve the levels of service for recycling and organics collections.

Co-mingled collection.

With this system recyclables are also collected from the kerbside, but they are tossed together into the collection vehicle, rather than being pre-sorted. The mixed (or co-mingled) recyclables are taken to a Materials Recovery Facility (MRF—pronounced 'murf') to be sorted, either by hand or mechanically. Some councils use MGBs to collect recyclables this way. Some use MGBs with a divider down the middle: one side for garbage, and the other for recyclables. These are separated within the truck as they are collected. Contact your council for more information on these services.

Collection of Green Organics

Green organics are defined as grass clippings, leaves, prunings, weeds and bushes. Many councils are becoming increasingly involved in collecting green organics separately for mulching or composting. This can be done in a number of ways, including:

- Drop-off centres for garden materials provided by councils. For example, the residents of Some council areas can deliver garden materials to the council depot, where they are mulched. Residents can take back mulch free of charge or for a small fee.
- Separate green waste collections by council during periodic clean-ups, or special vegetation collections. For example, Pittwater council provides four such collections per year.
- Regular household collections. With such systems, households are given a separate bin for organics; the bin is usually collected weekly or monthly.
- Ask your council for further information.

Container Deposit Legislation

South Australia has been recycling beverage containers since 1897. However, it wasn't until the South Australian Parliament enacted the Beverage Container Act in 1975 (operational in 1977) that what we know as CDL or Container Deposit Legislation, came to be. The Act is based on the Polluter Pays Principal. A small deposit is made on a beverage container at the time of purchase and this is redeemable upon return. If the consumer discards the container then the value of the deposit is lost to them and it become available to anyone else collecting the container.

Education & Promotion

Councils play an important role in waste reduction education and promotion. Many councils promote home composting and sell composting bins and worm farms at near cost-price. Some councils have employed waste education officers to coordinate waste reduction education in local schools, businesses and households. Other community based organisation such as KESAB offer education programs relating to waste and recycling.

Cleaner Production

Cleaner production addresses the first point above. It involves industry reviewing its production processes to identify ways of reducing both the amount and toxicity of waste, and reducing the resources, water and energy it uses. Industry can reduce its costs considerably through cleaner production.

The Victorian EPA's cleaner production guide for industry, *Waste Minimisation, Assessment and Opportunities for Industry* (EPA Victoria, July 1993) cites the example of the multinational chemical company, Du Pont. To quote Du Pont's Richard Warburton:

I challenge the very concept of the inevitability of waste. I want us to create a corporate culture where there is no such thing as industrial waste. I believe anything that goes out the waste pipes may well be something that can be recycled, reused or sold.

In Australia, the company has developed 15 new businesses from by-products of its main polymer line, adding an additional \$70 million per year to their operation.

Cradle-to-grave Responsibility

This term means that the manufacturer of a product retains responsibility for the product from manufacture to disposal. Manufacturers can do this by taking back their own products and re-using or recycling them themselves, or else by funding the collection and recycling of their products by others.

This principle of cradle-to-grave responsibility has formed the backbone of waste reduction programs in Germany, where manufacturers of packaging, computers and cars take their products back to be dismantled for reuse or recycling. This program allows shoppers to leave excess packaging behind at the store and makes the retailer and manufacturer responsible for recycling costs.

Product Redesign

To reduce waste, industry has options beyond reviewing its production process. It may also reassess the products it makes; for example, an Australian company, Boomerang Imaging Supplies, has designed a re-usable photocopier toner cartridge and provides a \$15 rebate for returned cartridges.

To help moves towards better design, the Royal Melbourne Institute of Technology (RMIT) runs an Eco Design program (funded by the Commonwealth EPA and the Australian Research Council) as part of its National Key Centre for Design. Similarly, in NSW, the EcoDesign Foundation researches and promotes the design of low environmental impact products and processes.

Life cycle assessment is one useful tool that helps industry reassess its products and processing. It involves assessing the environmental impact of all inputs to the production process. We can then compare alternatives and identify the process that has the least environmental impact.

Community & Environment Groups

There is a multitude of community and peak environment groups actively involved in reducing waste. The ways in which they contribute are outlined below.

Campaigning

Environment groups provide a voice for the environment to government, council and industry. Most groups rely on volunteers and are always seeking help.

Education & Providing Information

Community and environment groups play an important role in providing information on waste reduction to their local community. The *Earth Works* New South Wales groups are already operating do this. Lismore Earth Workers, for instance, have a regular stall at the popular Channon Markets where they provide information on waste reduction and composting.

Some community groups focus specifically on a particular aspect of waste. Nursing the Environment is a group of nurses that educates health care providers and their clients and patients by sharing ideas and information on safe alternatives for health care products and practices. It focuses particularly on the large numbers of throw-aways being used in hospitals.

Practical Waste Reduction Programs

Community and environment groups also get involved in practical waste reduction. There are countless good examples. Here are a few:, from the Earth Works New South Wales program:

- Food co-ops. There are several community food co-ops in NSW. They sell produce in bulk; shoppers bring their own re-usable packaging. Alfalfa House co-op in Enmore is an example of a food co-op that has been operating for over a decade. In this time it has probably saved over half a million items of packaging.
- Reverse Garbage. This is a community reuse program in which industry off-cuts are salvaged and sold at a warehouse in Marrickville. Schools can purchase bales of reused items to be used for arts and craft.
- SCRAP (School Communities Recycling All Paper- NSW). This is a program in which schools and other educational institutions collect their used paper for recycling and receive recycled paper in return.

Some Organisations:

Clean Up Australia

Clean Up Australia has been remarkably successful in rallying the people of Australia to clean up their local areas on one day each year. It has now gone global with Clean Up the World.

Beverage Industry Environment Council (BIEC)

BIEC coordinates two waste minimisation programs:

Do the Right Thing, an anti-litter campaign.

Recycle NSW, a recycling campaign.

KESAB Environmental Solutions



KESAB is the oldest "Keep Australia Beautiful" organisation in the country. Founded in 1966, its objectives are:

To develop and implement dynamic programs in which all South Australians and visitors can participate, to preserve and improve South Australia's total environment.

to prevent littering

to preserve and protect natural resources

to pursue approved waste minimisation and management practices

to protect and improve South Australia's scenic beauty

Keep Australia Beautiful Council (KABC)

KABC is responsible for the following waste programs:

Tidy Towns

Metro Pride

Waste Watchers

Bush Care

Champion of the Environment Award scheme for schools, industry and other organisations.

KABC, in conjunction with the Commonwealth EPA, has developed a Waste Minimisation Manual for Local Government; it also produces materials for schools (for example, Green Dragon, a waste minimisation computer game).

Each One of Us

Everyone has a role to play in reducing waste.

Each of us is responsible for the generation of domestic waste; we are also responsible in part for the production of non-domestic waste (commercial, industrial, building and demolition), because non-domestic waste is created in the process of providing us with the goods and services we use in our homes, shops, offices and schools.

Government, industry and community groups can provide us with the framework (policies, facilities and programs) to help us reduce waste, but ultimately every individual has to take responsibility for playing his or her part. Each one of us can make a difference by making an active choice to live with less waste.

For example, a community based food co-op can contribute to reducing waste only if people support it. And how can industry hope to market recycled products if we continue to choose products that have been made from new raw materials?

The *Earth Works South Australia* program is based on the belief that an average household could reduce its waste levels by up to 85% by introducing a simple set of practices. This belief was translated into reality by one enthusiastic Earth Worker, who recommends, 'Think twice before disposing of any household waste'. Before attending an *Earth Works South Australia* course he used to fill a 120 litre bin every week. After attending the course, by 'thinking twice' and composting, refusing shopping bags and recycling paper and packaging, he has reduced it to a 60 litre bin every three weeks!

There is, too, the remarkable feat of an Earth Worker couple who set themselves the challenge of seeing how little waste they could generate. By composting, taking their own containers when doing their shopping and carrying their fruit and vegetables home in a clothes basket they managed to slash their garbage down to only two bins in an entire year. Perhaps you won't achieve this level of reduction, but *Earth Works South Australia* will help you to reduce the amount of garbage you create and help others to reduce theirs too.

THE WASTE HIERARCHY: THE THREE Rs— REDUCE, REUSE, RECYCLE

Introduction

It is all too easy to become overwhelmed by the environmental problems of our 'throw-away' society; we need to focus on solutions.

The amount of waste we create must be reduced. We all create waste, and we all have a part to play in reducing it. We can all learn and help to educate each other in the community in the many practical ways in which we can make less waste.

Life of a Product

One way to appreciate the importance of the ordering of Reduce, Reuse, Recycle is to trace the life of a product from its cradle (extraction of raw materials) to its grave (ultimate disposal).

Consider a glass drink bottle. The key features of the life of a bottle involve:

- resource extraction—mining sand, soda and limestone and transporting these to the factory
- production—forming the glass through melting these materials (which uses considerable energy) and cooling the glass using water (which puts polluted water vapour emissions into the air)
- filling, retail and consumption—transport to local filler, local retailer and then consumer
- disposal—transport to nearby or distant landfill or incinerator, or being thrown away as litter (posing a health risk and a bushfire risk).

The 3Rs applied to this case would be:

- **Reduce**—avoid the use of the glass bottle in the first place by carrying your own water bottle instead. In this way you can help to reduce the negative impacts of glass production and use.
- **Reuse**—choose drinks in refillable bottles. In this case the bottle is returned to a local filler where it is washed out and filled again. Typically, bottles need to be transported shorter distances to the filler to be refilled. This means much less energy is used and less pollution is generated compared with making new glass. Not many of these centres are left in South Australia. You can also consider buying a bottle you could refill yourself.
- **Recycle**—ensure that the bottle is placed in a recycling container for collection. Recycling involves returning the bottle material to the original production process. The bottle is crushed and transported to a centralised glass making factory. Although less energy is used to make glass from cullet (old glass) this process produces a similar amount of pollution.

This case shows that if we follow the 3Rs less raw material will be needed and less waste will be produced. The order of importance of the 3Rs highlights the importance of other aspects of the life cycle of products, such as energy use.

Once we consider the full life cycle impacts of products and packaging we can understand the order of importance of the waste hierarchy.

Reduce

'Reduce' simply means not creating waste in the first place or creating as little waste as possible. This is clearly the simplest and most effective way of cutting down the waste problem.

The most common ways of reducing waste include:

- avoiding buying unnecessary products
- choosing products that have a minimum of packaging, that is, buying in bulk and buying goods in a concentrated form
- using durable and repairable products rather than short-life throw-aways
- making the most of products by using only as much as you need
- using simple general purpose products.

Reducing waste is all about using only those products and packaging that are really necessary, and only in the amounts we need.

Reducing waste also means reducing consumption. This is of vital importance for Australians and other members of the 'developed' world if we are to have a more equitable sharing of the world's resources. Even when we are considering something apparently small like taking our own shopping bag, we are still putting into practice the philosophy of 'think globally, act locally.'

Reducing also saves money at the same time as saving waste. For example, if you were to start using a water bottle instead of buying one soft drink a day in a throw-away container, you would avoid buying 365 containers in a year, and save yourself between \$300 and \$500!

Here are some 'reduce' questions we can ask ourselves:

- Do I really need this?
- Do I need to use that much?
- How can I maintain, repair or restore it?
- Is there a simpler, less wasteful alternative?
- Will it last?
- Is it over-packaged?
- What are the environmental impacts of this?

At a quite profound level, these 'reduce' questions challenge us to reconsider our consumption habits. Do I think first before consuming, or do I just buy for the sake of buying?

Reuse

The best type of reuse is to use an item again for the same, or a similar, purpose. It is quick and easy, and the item does not need processing between uses. You can reuse items within your home (for example, jars) or outside your home (for example, clothing). Either way, re-using products reduces the need for new items and raw materials.

Common types of reuse behaviours include:

- re-using packaging, such as glass jars and plastic bags
- re-using household items, including clothes, furniture, books and music
- retreading tyres

There are also many opportunities to reuse items for different purposes. For example, jars are perfect for storing things around the house and can also be used when you buy products that are sold unpackaged.

Some 'reuse' questions we can ask ourselves are:

- Just because I no longer need it, does it have to become waste?
- Can I sell/pass it on to someone else who could use it?
- Can I buy it second-hand?
- Can I repair or restore an existing item?
- Is there a durable/re-usable alternative to a throw-away item?

Reuse challenges us to question our attitudes to used items. How do I feel about using 'second-hand' items? Do things have to be 'new' for me? Am I prepared to find others who could use items for which I no longer have a use?

Recycle

Recycling involves breaking down the materials of a used product and using those materials to make something new.

The most common materials that can be recycled from household waste are:

- glass
- aluminium
- paper
- liquidpaperboard
- plastics
- food and garden waste (by composting)
- steel cans
- scrap metal
- oil
- motor vehicle batteries.

Recycling is *closed-loop* when the materials from a product are used to make the same type of product again. For example, office paper can be used to make recycled office paper.

Recycling is *open-loop* when the materials from one type of product are used to make another, often lower grade, type of product. Open-loop recycling is often called 'reprocessing' or 'down-cycling'.

Another distinction in recycling is made between pre-consumer and post consumer recycling. *Pre-consumer* recycling involves putting the off-cuts back into the production process. *Post-consumer* recycling is about recovering the materials from products after they have been used.

Pre-consumer recycling is common in industry. The off-cuts are usually very clean and easily incorporated back into the production process. For example, much of the plastic recycling in Australia uses pre-consumer plastics.

The word *recyclable* on an item often confuses people. Recyclable simply means that it is possible to recycle the material—but it may not be practicable to do so. Recyclable means that, somewhere in the world, a process exists to recycle the item. This may be nice to know, but it doesn't mean that your item can be recycled, unless there is a collection and processing system available for it locally. For instance, most people know that steel food cans are recyclable, but not all local councils collect them as part of their recycling programs.

So next time you come across a claim that an item is 'recyclable', it is important to ask yourself the question, 'But can I recycle it?'

An important part of closing the loop on recycling is to choose products that have been made from recycled materials. Manufacturers are reluctant to support recycling schemes unless they know that they are going to be able to sell products made from the materials collected.

Rarely are products made from 100% recycled material. And many materials cannot be recycled indefinitely. Though there are 100% recycled writing papers available, the weakening of the fibres each time the paper is recycled means that each piece of paper can be recycled only five to 20 times. The amount of recycled material in a product is termed its *recycled content*, and this is sometimes specified as being either pre-consumer or post-consumer. By supporting products made from 'post-consumer' materials we can complete our own recycling loops.

Some recycling questions to ask ourselves are:

- Is it made from materials that can be recycled, and is there a local collection for them?
- Can the item easily be recycled, or are the materials mixed in such a way that they are difficult to separate?
- Is it made from recycled materials? What percentage? Closed or open loop?
- Is it made from pre-consumer or post-consumer recycled material?

Recycling Issues

Quality of the Materials

Materials collected for kerbside recycling must be of a form and quality that are suitable for the intended production process. This means that the materials that are collected need to be free from contamination, and specific grades of material may need to be collected separately.

Some of the more common requirements for recyclables are:

- paper—should be free from contaminants such as food, glass or plastics. Fax paper, carbon paper, waxed paper and soiled paper cannot be recycled. Some councils collect newspaper separately from other paper so that the newsprint can be closed loop recycled or exported, and the other paper can be recycled into packaging.
- glass—only see-through bottles and jars are recycled through council collections. Recycling companies sort the glass into the three colours (brown, green and clear) for closed loop recycling. Ceramic plates, cups and cookware and ceramic bottles should not be included in recycling bins. One ceramic item can be enough to spoil an entire recycling batch!
- aluminium—cans only.
- plastics—while there is some mixed plastic recycling, for most plastic recycling specific types of plastic must be collected separately. (For details on the plastic types, see the section on plastics below.) Most councils collect PET containers. These containers are identified by a 1



within a recycling mobius from 2-7 as well.

. Some councils can also collect other types of plastics

Markets

For recycling to be successful we not only need to collect materials and turn them into other products—we also need to have a market for those products.

In the past there have been graphic media photographs of stockpiles of recyclable paper with no markets. In this situation, more and more householders had put out their paper to be recycled, so that the traditional market which used this paper to manufacture packaging became saturated—hence the stockpiles. This problem has been overcome by generating export markets for newsprint; a newspaper recycling plant established at Albury has also increased the demand for used paper. All newsprint and other paper put out for recycling can now be used.

Closed loop recycling provides a means of creating markets for recyclable materials, since the market for the product already exists. As an example, in the early days of recycling, all three colours of glass containers were recycled into brown glass (which can tolerate a high percentage of mixed cullet). But as recycling rates increased, the amount of recycled brown glass produced soon approached the market limit. The solution was to move to closed loop recycling in which glass containers are sorted and recycled back into the same colour type. With this system up to 100% of glass containers can be recycled.

Economics

Even though most people believe we should recycle more, the costs of recycling can be high. Collecting, sorting and transporting materials for recycling all cost money, and if this exceeds the price that industry is paying for new materials then recycling may not be economically worthwhile.

This is the case for most local recycling programs: it costs more to collect materials than what councils receive for them.

Recycling competes with two alternatives:

- the price of raw materials; if these cost less than the recycled materials, industry will be reluctant to recycle
- the price of waste disposal; if it costs less to dump recyclables at the tip than to recycle them, many will do just that.

The above three recycling issues—quality of materials, markets, and economics—are all interrelated. For example, higher quality materials may attract a better price than low quality. There are, on top of these issues, many opinions as to what, and how much, should be recycled. Some believe that it should be left to the free market to determine how much is recycled, while others believe that we should recycle everything we use.

GETTING PRACTICAL WITH THE 3Rs

In many cases we don't need to wait for further government or industry programs. There are already many ways in which each of us can reduce waste and as you discover for yourself ways of reducing waste, you will probably be surprised at how little waste you will produce. The money saved will be a nice bonus as well!

We can encourage others to reduce waste simply by talking about these practical methods and leading by example. Family, friends, neighbours and workmates will soon realise that they can easily play an important role themselves in reducing waste.

Green Cleaning & Pest Control

A trip down the cleaning products aisle of a supermarket reveals a wide range of specialist products, made with myriad different chemicals. Many of these chemicals are dangerous to one's health if used incorrectly and pose pollution problems when they are poured down our sinks and drains, or thrown in the bin. Considering household products is part of waste reduction, because the disposal of these products is a household hazardous waste issue.

Most of us have heard of dubious 'environmentally friendly' claims on the labels of cleaning products. For example, the February 1990 issue of *Choice* magazine reported that two cleaning products that carried such claims contained toxic chemicals that accumulated in the tissue of aquatic animals.

Another source of confusion has been the word 'biodegradable'. In NSW such a claim means that 80% of the surfactant (detergent agent) content must break down within 21 days. But what of the remaining 20%, which is made up of extenders, fillers, colourings and perfumes, many of which are pollutants?

Phosphates are used to soften water and help break up dirt. When these are poured down the drain into the stormwater system they proceed untreated into our waterways. The phosphates promote algal blooms, which are a major problem in waterways. They also contribute to leachate pollution in landfills. Phosphates entering the sewerage system are treated before they enter waterways.

Some detergents contain up to 30% phosphates, though the average is 11%, and industry has agreed to reduce this to 5%. Several detergents are now sold 'phosphate-free', and an identification label has been developed for them. Some companies have replaced phosphates with chemicals known as 'zeolites', which can still cause pollution problems. It is best to look for phosphate-free detergents that are also zeolite-free, or you could make your own detergent from natural ingredients (see below).

Chlorine bleaches, and the toxic organochlorine compounds (carbon-based compounds that contain chlorine) which are produced by them, can also contribute to pollution problems. Chlorine was originally produced in industry as a by-product in the manufacturing of caustic soda. Since then, however, it has become so widely used that it's hard to find an activity in our society that does not in some way use chlorine, be it as a gas or in organochlorines. Chlorine is not commonly found in organic compounds in nature; organochlorines are largely human-created substances. Nature has not developed a way of processing these substances, which is why organochlorines (like DDT and PCBs) have caused highly intractable pollution problems.

A wide range of pest control products can become health hazards around the home, especially to children. The residues that remain in the discarded packaging contribute to pollution at landfills. Many of the chemicals used in these products are listed as 'highly hazardous'; poison cautions and information must be printed on the packaging.

We should bear in mind that many of these so-called convenience products and chemicals are only recent creations. Only as short a time as one or two generations ago, people cleaned with much simpler, and far less toxic, agents. More and more people are switching back to these.

Most of a household's cleaning needs can be satisfied with the follow simple ingredients:

- bicarbonate of soda (also known as baking soda): a general-purpose cleaner, deodoriser, water softener and scouring powder
- vinegar: a general purpose cleaner that cuts grease and acts as a deodoriser
- washing soda: used to cut grease, soften water, remove stains and disinfect
- cloudy ammonia: used to cut heavy grease and grime. Be careful when using cloudy ammonia as it can be a strong irritant to the eyes, nose and lungs. Be careful not to use it in confined spaces, and consider using a mask. *Never* mix ammonia with bleach.
- pure soap: used as a general purpose cleaner for bathrooms, laundries and kitchens. Look for plant-based soap that is free from colourants, scents and other additives.
- eucalyptus oil: a disinfectant (50–100 mL per litre of water), deodoriser, stain remover (for grease and ink) and insect repellent. It can be toxic, so do not use it on the garden, and keep it out of reach of children.
- borax: a deodorant, fabric softener, bleach, and disinfectant. Borax is poisonous, so use it sparingly and be careful when you are using and storing it.

Ingredients

A number of cleaners can be made from these ingredients:

- **General purpose cleaner:** 2 teaspoons of bicarb soda, 1 teaspoon soap, 1/4 litre of water. To cut grease, add 2 teaspoons of vinegar or washing soda.
- **Dishwashing detergent:** use pure soap. Add vinegar to cut grease.
- **Bathroom and kitchen surfaces:** pure soap and bicarb. Apply with a firm brush.
- **Laundry soap:** the book *The Green Cleaner* (Lord 1989) contains a recipe for making your own laundry detergent that is mild enough to use as a hair shampoo.
- **Cleaning teeth:** Simply use bicarb soda and rinse well.

Pest Control

Pests can also be controlled using low toxicity methods, including:

- keeping your house clean, particularly the kitchen—this is the best way to deter pests
- sealing and repairing any gaps or cracks in walls or screens
- catching cockroaches by placing a little beer or cake in a bottle and lightly greasing the neck, or by using a sticky trap. Borax can be used to poison them—but be careful.
- growing insect-repellent plants near windows. If you must kill insects, use a fly swatter.
- if cleaning is not enough to control ants, use a bait made from a mixture of 30% borax and 70% of whatever it is that the ants are eating.

These are only some of the many 'green-cleaning' suggestions available. They have come from two excellent sources: *The Green Cleaner*, and *Stepping Lightly on the Earth—Green Living No. 2* (Greenpeace 1993), which is a home hints guide produced by Greenpeace. Your local library or bookstore may have other titles.

Green cleaning and pest control offer interesting examples of some of the global challenges we face when we are trying to reduce waste and pollution. For instance, using borax (even though it is poisonous) for pest control is a simpler, less harmful alternative to other more toxic commercial products.

Saving Money By Reducing Waste

Reducing waste not only reduces the stress we place on the environment—it can also save us money.

If you bought one bottle of spring water every day, at a typical cost of \$1.20, this would cost you \$438 a year. If, on the other hand, you carried a water bottle with you instead, the equivalent volume of water would cost less than 20 cents, and you would have avoided buying 365 drink containers. You could even invest the money you have saved in buying a water filter!

The following facts and figures were gained by comparing prices in a typical supermarket:

- plastic packaging for laundry detergents can cost 10–30% of the total cost of the product. Using refills can save from 40 cents to \$1.30 per pack.
- A household can spend up to \$16 a year on toilet cleaners that do little more than change the colour of the water.
- Small individual packets of chips can cost up to 44% more than the same amount sold in a large packet.
- Salt sold in recyclable cardboard is 20% cheaper than that sold in plastic. The salt can be transferred into your own containers at home.
- Tea sold in tea bags can cost up to twice as much as that sold in bulk.

Composting can also save a considerable amount of money. A typical household can produce 100–200 kg of compost each year. Think of how much this would cost if you bought it from a nursery. Making your own liquid fertiliser can save you all the money you would otherwise spend on synthetic fertilisers for plants and lawn.

These savings further emphasise the importance of reducing and re-using before recycling. This is where the real savings can be made.

REFERENCES

Birch, C. 1976, *Confronting the Future*, Penguin Books Australia

Connett, P. 1991, *Waste Management as if the Future Mattered* (video), Work on Waste USA Inc. 82 Judson St, Canton, NY 13617

Environment Protection Authority Victoria, 1993, *Waste Minimisation, Assessment and Opportunities for Industry*, EPA Victoria, Melbourne

Lord, B. 1989, *The Green Cleaner*, Schwartz and Wilkinson, Melbourne

Meadows, D. H., Meadows, D. L. & Randers, J. 1992, *Beyond the Limits : Global Collapse or a Sustainable Future*, Earthscan Publications, London

NSW Environment Protection Authority 1995, *Waste Reforms*, NSW EPA, Sydney

NSW Environment Protection Authority 1996, *Environmental Guidelines: Solid Waste Landfills*, NSW EPA, Sydney

NSW Environment Protection Authority 1996, *Green Waste Action Plan*, NSW EPA, Sydney

NSW Environment Protection Authority 1996, *Proposed Waste Minimisation and Management Regulation 1996*, NSW EPA, Sydney

Seymour, J. & Girardet, H. 1989, *Blueprint for a Green Planet*, Dorling Kindersley, London

Toffler, A., 1970, *Future Shock*, Pan Books, London

World Commission on Environment and Development 1987, *Our Common Future*, Oxford University Press, Sydney [Brundtland Report]